

SMART CIRCUIT



Methodology for Commercial Applications

Overview

1. Analysis and assessment of facilities and operations.

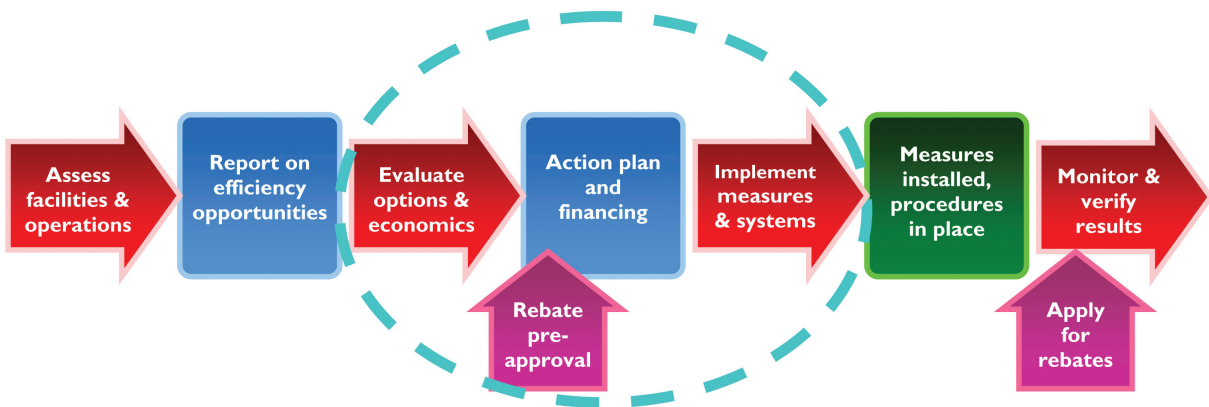
An energy audit is the first step to determine opportunities for energy savings. Detailed metering is a critical piece of an audit. Metering at the facility level will determine overall load profile and peak demand periods, and high-energy use activities. The next step is to identify the cost savings approach: peak reduction, kwh reduction, combination. To do this, identify the specific loads and circuits which contribute to the overall peak demand periods, or have unnecessary usage. This can be accomplished by manually turning off circuit breakers during peak times, or by installing Smart Circuits on these loads and circuits and monitoring the usage in real time.

2. Implementation of load monitoring and load switching.

Once the loads that are to be controlled are identified, Smart Circuits are installed (if there weren't installed as part of step 1 above) in series between the load and the circuit breaker. It is important to verify that switching the load on and off will not damage the equipment in any way, or interfere with business operations or process. Sign-off by the customer is recommended (see back). Baseline data of usage should then be collected. Next, rules are created to automatically switch the loads off. Rules can be based on load shedding, time-of-day, or kwh.

3. Ongoing monitoring.

Once the rules are activated, it may be necessary to modify some rules and fine tune some values. It is important to verify the anticipated savings are achieved. Also, as weather changes or the business operations change, it may be necessary to periodically make changes. Since the user interface is browser based, it is easy to make changes on the fly.



Steps

1. Identify facility

These are not hard requirements, but a facility meeting this profile will likely have a payback within 2 years. Profile = Peak charge pricing (often called a SG rate), \$1000 monthly electric bill, switchable loads.

2. Circuit listing

Complete listing of all circuits based on breaker panel listing. See back side for example.

3. Decide approach(s)

- Overall peak reduction: This requires entire facility usage data. We recommend a WEM meter www.energytracking.com, which can meter up to 3 phase applications and output the data over the internet. A 3rd party vendor, www.peaksoftwarecorp.com provides integration between the WEM meter and the SC20.*
- Specific peak reduction: i.e.: alternating loads such as a fans, or refrig & freezer*
- Time-based: i.e. turning loads off at night, or load shifting to off-peak times*
- Cumulative consumption: turning off optional loads during high rate times*

4. Preliminary list of SC20's

List of circuits that will be monitored and/or controlled by a SC20.

5. Submit rebate application

Many utilities offer rebates that will pay for the SC20, including installation, however the application needs to be submitted before any work is performed.

6. Verify loads on circuits

Verify the loads on each circuit since the description is often incorrect.

7. Load switching sign-off

The facility manager should sign off that they approve before anything is installed, acknowledging that power interruption to the connected load will not harm the equipment or harm the business operations. See back side for example.

8. Installation

SC20 and other equipment.

9. Monitoring

View data 24/7 from the web. Assess which loads contribute to the facility peak and which loads run unnecessarily.

10. Analysis

Verify feasibility of selected approach in step 2. After seeing the actual data, you may want to make changes.

11. Rule creation

Develop rules to automatically switch loads on and off, based on the analysis in step 10.

12. Load switch

Testing & implementation.

13. Verify results

Reduction achieved?

14. Back to step #9 and fine tune

Sample Electrical Panel Inventory (Restaurant)

PANEL 1			INITIAL IN EACH BOX FOR APPROVAL					
circuit	phase	amps	description	SC20	verify equip is OK	verify process is OK	OK to install SC	OK to switch load OFF
1	A	20	receptacles					
3	B	20	receptacles					
5	C	20	receptacles					
7	A	60	pan washer					
9	B	60	pan washer					
11	C	60	pan washer					
13	A	20	walk in freezer					
15	B	30	walk in freezer					
17	A	30	walk in freezer					
19	B	20	walk in refrigerator	X	QKCF	QKCF	QKCF	QKCF
21	C	20	fan	X	QKCF	QKCF	QKCF	QKCF
23	A	20	fan	X	QKCF	QKCF	QKCF	QKCF
25	B	20	exhaust fan	X	QKCF	QKCF	QKCF	QKCF
27	C	45	ELT-1					
29	A	45	ELT-1					
31	B	45	ELT-1					
33	C	20	lighting - ceiling					
35	A	20	lighting - scones					
37	B	20	lighting - exterior					
39	C	20	lighting - kitchen 1					
41	A	20	lighting - kitchen 2					
total				4				

PANEL 1			INITIAL IN EACH BOX FOR APPROVAL					
circuit	phase	amps	description	SC20	verify equip is OK	verify process is OK	OK to install SC	OK to switch load OFF
2	A	20	microwave					
4	B	20	microwave					
6	C	20	microwave					
8	A	20	microwave					
10	B	30	expresso					
12	C	30	expresso					
14	A	40	Bev disp Kit					
16	B	40	Bev disp Kit					
18	C	20	refrigerator	X	QKCF	QKCF	QKCF	QKCF
20	A	20	grinder					
22	B	20	prep table					
24	A	20	blender					
26	B	20	blender					
28	C	30	Sandwich press					
30	A	30	Slicer					
32	B	20	Slicer					
34	C	20	Prep table					
36	A	20	Mixer					
38	B	20	Mixer					
40	C	20	Mixer					
42	A	20	Convection					
total				1				

PANEL 2			INITIAL IN EACH BOX FOR APPROVAL					
circuit	phase	amps	description	SC20	verify equip is OK	verify process is OK	OK to install SC	OK to switch load OFF
43	A	20	exhaust fan #3	X	QKCF	QKCF	QKCF	QKCF
45	B	20	exhaust fan #2	X	QKCF	QKCF	QKCF	QKCF
47	C	20	exhaust fan #1	X	QKCF	QKCF	QKCF	QKCF
49	A	20	Roof GFI					
51	B	20	FSF #1	X	QKCF	QKCF	QKCF	QKCF
53	C	20	FSF #1	X	QKCF	QKCF	QKCF	QKCF
55	A	20	FSF #1	X	QKCF	QKCF	QKCF	QKCF
57	B	60	RTV-1					
59	C	60	RTV-1					
61	A	60	RTV-1					
63	B	20	receptacle					
65	A	20	lighting					
67	B	20	receptacle					
69	C	20	air conditioning 1					
71	A	20	air conditioning 2					
73	B	20	air conditioning 3					
75	C	20	Panel L-1					
77	A	20	Panel L-1					
79	B	100	Panel L-1					
81	C	100	Panel L-1					
83	A	100	Panel L-1					
total				6				

PANEL 2			INITIAL IN EACH BOX FOR APPROVAL					
circuit	phase	amps	description	SC20	verify equip is OK	verify process is OK	OK to install SC	OK to switch load OFF
44	A	20	Display Case	X	QKCF	QKCF	QKCF	QKCF
46	B	20	Refrig	X	QKCF	QKCF	QKCF	QKCF
48	C	20	Proofier					
50	A	60	Proofier					
52	B	60	Proofier					
54	C	60	C oven					
56	A	20	C oven					
58	B	30	C oven					
60	A	30	Recept					
62	B	20	C-oven					
64	C	20	B- Proofier					
66	A	20	receptacle					
68	B	20	sheeter					
70	C	20	show window	X	QKCF	QKCF	QKCF	QKCF
72	A	20	show window	X	QKCF	QKCF	QKCF	QKCF
74	B	20	coffee warmer	X	QKCF	QKCF	QKCF	QKCF
76	C	20	coffee warmer	X	QKCF	QKCF	QKCF	QKCF
78	A	20	coffee warmer	X	QKCF	QKCF	QKCF	QKCF
80	B	20	soda machine	X	QKCF	QKCF	QKCF	QKCF
82	C	20	ice maker - 1	X	QKCF	QKCF	QKCF	QKCF
84	A	20	ice maker - 2					
total				9				

